HUSKY TECHNICAL NOTE

Number 102

Issue 1 Date 09JA85

Applicable to	All Hunter, S.P. and M-208 operating systems up to 9Fr and 9G where hardware does not support Mod 38.
Abstract	
Title	POWER LOSS

If there is a sudden power loss within a Hunter due to either the batteries being removed, or nicads at the end of their life dropping voltage very quickly while a program is being run using a CONT mode, the result after powering up with either new or recharged batteries is dependent on the activity of the Hunter at the time the batteries were removed or failed and is as follows:

1. If the Hunter is idle and waiting for keyboard entry, program execution will continue from exactly the same place on power up, as if nothing had happened, or as if it had been powered down manually.

2. If it is actually executing a Basic program, eg: doing calculations or storing data, then on power up the program will start executing from the first line in the program. This can be detected under most circumstances by maintaining a flag to re-enter the program without re-dimensioning all the variables.

3. If it was actually executing a CP/M based program calculating or storing data, the line in DEMOS which started the CP/M program off will be re-executed causing the program file to be reloaded into the T.P.A. and programmed to start again.

Sudden power loss is very unusual, but does illustrate the importance of using the keyboard entry idle mode of the Hunter in order to avoid problems if batteries are inadvertently removed.

For details of 9G applicability, see Technical Note Number 101.

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HUSKY TECHNICAL NOTE

Number 104

Issue ____________ Date 09JA85

Applicable to	All Hunter operating systems M-208, S.P.
Abstract	
Title	POWER CONTROL

To achieve an extended battery life, the Hunter has a sophisticated power control system.

The power control system reduces the amount of current needed to satisfy current user requirements. It has three states:

1. Turned OFF - where it draws a minimal current.

2. Operating - where it is actually executing program and performing calculations, updating the screen, communicating, etc. This is a maximum power usage condition.

3. Where the Hunter is idle, but turned on. On this condition the Hunter appears to be completely active with the LCD screen display characters and responding to keys pressed. In fact, it is detected that the only duty it has to perform is to fetch a key depression.

When the Hunter has its peripheral RS-232 port powered up, this merely increases the total current drawn and makes no difference to the concept in items 2 and 3 above.

The difference in the current drawn in conditions 2 and 3 is very significant. When the Hunter is operating it draws approximately 80 to 100 mA. However, in the idle state, as in condition 3, it draws only 15 mA.

Clearly, this is important in extending battery life and use of this facility should be made at all times.

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The Hunter will default to using this facility under normal programming conditions, ie: when the program is normally waiting for keyboard input by either using INPUT or INCHR in Basic, or any of the keyboard reading system calls, ie: calls 1, 10 and 47.

For this reason it is not normally necessary to consider the idle feature within the Hunter as it happens automatically. However, it can be defeated by using just a keyboard scan and trying to continue further execution. In Basic this is done by using INKEY or from CP/M using the "status" calls 6 or 11. Obviously, it is necessary to use the status keyboard technique for some applications at certain points. However, they should be avoided from the point of view of high power consumption.

Within Basic, the only way of picking up a keyboard key without echoing it to the screen is using INKEY. From the above, this is a problem from the current consumption point of view. The solution is to use a system call as follows:

Firstly, set the argument to 47 with Z=ARG(47) and then follow that with the system call A=CALL5. This will return the key decimal value into the variable A after a key has been pressed. This system does not echo the key to the screen and does enable the power save feature.

NOTE: If this feature is used extensively it will be difficult to break out of the Basic program by pressing escape as it is not recognised during the system calls.

HUSKY TECHNICAL NOTE

Number 107

Issue

Date 09JA85

Applicable to Hunter, Husky S.P. and M-208 operating systems up to and including version 9Fr.

Abstract

Title Rapid Screen Displays

It is possible to create, using BASIC commands, up to six individual text screen displays which can be displayed rapidly using a single BASIC instruction.

The Hunter display gives an 8 line by 40 character 'window' on to a virtual screen of 24 lines by 80 characters. thus the virtual screen can be said to comprise six 'windows'. The cursor can be positioned into any character position on the virtual screen by the BASIC commands OPCHR15,x,y or LOCATE x,y (where x and y are the screen coordinates). The two instructions differ in the single fact that the display window is only positioned over the relevant area of the virtual screen when using the LOCATE command. Thus using the command OPCHR15,x,y permits the program to write text into an area of the virtual display whilst displaying another portion of the virtual display. Subsequent LOCATE instructions into already written areas of the vrtual screen will make visible in the screen 'window' any previously PRINTed text. As it is not necessary to constantly PRINT to the same portion of the virtual screen, this gives fast changes of text screen display.

To establish the text in the required display window, use the OPCHR15,x,y command to locate the cursor and PRINT the required text.

to display a required window, use LOCATE x,y to place the cursor within the window. This will cause the relevant part of the virtual screen to be displayed.

Should you not require to display the cursor, it can be switched off using the CUROFF command.

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This simple Basic Program FLIPSCRN.HBA demonstrates this facility:

```
10   CLEAR:CUROFF:KEYOFF:CLS
20   GOSUB1000
30   INKEYA:IFA=0THEN30ELSEIFA<49ORA>54THENBEEP:GOTO30
40   ON(A-48)GOTO100,110,120,130,140,150

100 LOCATE1,7:GOTO30
110 LOCATE79,7,GOTO30
120 LOCATE1,15:GOTO30
130 LOCATE79,15:GOTO30
140 LOCATE1,23:GOTO30
150 LOCATE79,23:GOTO30

1000 FORI=1TO6:OPCHR15,1,I
1010 PRINTSTRING$(38,65):NEXT
1020 FORI=1TO6:OPCHR15,41,I
1030 PRINTSTRING$(38,66):NEXT
1040 FORI=9TO14:OPCHR15,1,I
1050 PRINTSTRING$(38,67):NEXT
1060 FORI=9TO14:OPCHR15,41,I
1070 PRINTSTRING$(38,68):NEXT
1080 FORI=17TO22:OPCHR15,1,I
1090 PRINTSTRING$(38,69):NEXT
1100 FORI=17TO22:OPCHR15,41,I
1110 PRINTSTRING$(38,70):NEXT
1120 RETURN
```


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HUSKY TECHNICAL NOTE

Number 111

Issue ______ Date 09JA85

Applicable to	HUNTER, SP. AND M-208 VERSION 9G
Abstract	
Title	DOWNLOADING PROGRAMS AND FILES

Frequently, programs are stored external to the Hunter in ASCII form on a desk-top microprocessor. These programs can be edited using normal text editors, for example Wordstar; and are then downloaded into the Hunter over the serial communications line.

The file space on 80K Hunters is limited, therefore it is essential to use the Basic LLOAD command in order to transfer large Basic programs directly into the execution T.P.A.

This transfer is best done at 4800 baud with hardware handshaking. This is the fastest method of loading the programs, but it is often necessary to load without any form of handshaking due to incompatibilities or misunderstanding between the appropriate Hunter and the desk-top. The Hunter is capable of loading Basic programs using LLOAD at 2400 baud without handshaking.

Transfer of files from a host into the Husky Hunter file space using INP in DEMOS can be performed at 4800 without handshaking.

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HUSKY TECHNICAL NOTE

Number 113

Issue ______ Date 09JA85

Applicable to HUSKY HUNTER

Abstract

Title SCREEN DISPLAY ANGLE

The screen angle adjustment is normally using function and up and down arrow.

It is possible to disable these keys by removing the arrow keys from the keyboard map. This disables the screen control feature. Also, it is sometimes necessary to pre-program different angles for the screen.

IT NM MTRONXSTUARJORD TA OWTER TSE OIXWE JNTSNI TSE CMERQM PRAXROH FB writing to the machine code port which controls the anlge. This can be done within Basic using:

```
OUT 96,x.
```

Where x is the value to be written to the angle display.

The port has 16 different positions which use every fourth value between zero and 63, ie: 0 48 12 etc.

The default setting has the value of 48 decimal. An increasing value will make the display more black and a decreasing value more white.

To use different keys it is necessary to have an internal counter variable which is incremented each time the key is seen, or decremented when a down arrow key is seen and then output to the LCD display itself.

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HUSKY TECHNICAL NOTE

Number 114

Issue 1 Date 27NO84

Applicable to HUSKY S.P., HUNTER AND M-208 OPERATING SYSTEM VERSION 9G

Abstract

Title SCREEN DISPLAY ANGLE

The screen angle adjustment is normally carried out using the 'function' and 'up' and 'down' arrow keys, whilst on the Husky S.P. and M-208 this has not been possible.

It is possible to alter the screen angle adjustment within the user's program by writing to the machine code port which controls the angle.

This can be done within Basic using:

```
OUT 96,x.
```

Where x is the value to be written to the angle display.

The port has 16 different positions which use every fourth value between 0 and 63, ie: 0, 4, 8, 12 etc.

The default setting has the value of 48 decimal. An increasing value will make the display darker whilst a decreasing value makes the display lighter.

To use different keys it is necessary to have an internal counter variable which is incremented each time the key is seen, or decremented when a down arrow key is seen and then output to the LCD display itself.

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TECHNICAL NOTE

Number 116

Issue 1 Date 03DE84

Applicable to: HUNTER REPORTER (SWEDEN)

Abstract:

Title: SWEDISH REPORTER CHARACTER SET

1. The Husky Reporter SW has a special Swedish character set installed with special characters assigned to ASCII codes 91, 92, 93, 123, 124, 125 and 126.

2. These special characters can be printed from Basic using:

```
PRINT CHR$(n)
```

   Where n is the required character code or from within a CP/M program by sending the code values to an RS-232 port.

3. Apart from the above mentioned case, the Reporter SW operates as detailed in the manual.

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HUSKY TECHNICAL NOTE

Number 117

Issue 2 | Date 09JA85

Applicable to: ALL HUSKY HUNTER SYSTEMS UPTO AND INCLUDING 9G

Abstract:

Title: DATA STORAGE LIFE

This information is to clarify the conditions which effect the quiescent battery life of the Husky Hunter (when the Hunter has been left switched off, but retaining data and program within its CMOS RAM.)

Quiescent battery life is dependant on these factors:

1. Quiescent current of the Husky Hunter,

2. The remaining capacity of the batteries,

3. Temperature variation,

4. Type of battery installed.

The Husky Hunter utilises a considerable amount of CMOS technology. CMOS static RAM has the feature that, when it is quiescent (just retaining data) power supply current falls to a very low level. While it is difficult to quantify for individual memory chips an average of a number of chips (up to 104 in the Hunter) can be assessed.
The average quiescent current is also temperature dependent and it should be noted that the Hunter is only tested for this parameter at normal room temperature. If temperature extremes are likely, the figures presented may well be misleading.

All Hunters are tested for their quiescent battery current to be less than 0.1mA (typically, it is about 60 microamps). If a new set of manganese alkaline batteries are installed prior to storage, one would expect them to realise their maximum capacity (approximately 1,800 mA hours) yielding a life expectancy of 18,000 hours or approximately 750 days. This does not allow for the self discharge characteristic of the manganese alkaline cells which amounts to 10% capacity loss per year. Therefore, one would expect self discharge capacity loss to reduce the quiescent battery life to approximately 600 days.

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HUSKY TECHNICAL NOTE

Number 117

Issue 2 Date 09JA85

The worst case for manganese alkaline cells is if the Hunter has been used until low battery warnings are being displayed. In this condition the battery has approximately one third of its capacity remaining, all of which is available for maintaining the memory during quiescent conditions, since the voltage required is low. Simple arithmetic, therefore, suggests 200 days remain after battery warning on low manganese alkaline cells.

Nickel cadmium (NiCd) batteries used fully charged have a capacity of 500mA hours which again would suggest a quiescent battery life of approximately 200 days. However, at high temperatures NiCds will self discharge quite rapidly. For extended shelf life it is not recommended to leave NiCds installed in the Hunter.

If the main batteries are removed, data storage relies on the internal NiCcad battery of the Hunter. This has a capacity of 90mA hours; and under normal conditions will remain fully charged by a trickle current from the main batteries. This would suggest 900 hours quiescent battery life under normal temperature conditions, or one month's shelf life.

It is necessary to empahsise that all the above notes relate to a Hunter stored at normal room temperature. At 50°C, quiescent current increases quite dramatically (by a factor of approximately five times). It is not recommended, therefore, to store the Husky Hunter under these conditions.

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TECHNICAL NOTE

Number 121

Issue 1 Date 7DE84

Applicable to	HUSKY HUNTER
Abstract	
Title	TEST REPORT ON HUSKY HUNTER SERIAL NO. 470137

The following information relates to an independent test carried out on the Husky Hunter Serial Number: 470137 Version 9Ff, 208K, model, results of which are as follows:

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HUSKY TECHNICAL NOTE

Number 121

Issue 1 Date 07DE84

1. **EQUIPMENT**

1.1 Equipment Under Test (EUT)
HUSKY HUNTER S/NO. 470137

1.2 Test Equipment

Singer Stoddart NM17/27 EMI/Field Intensity Meter (20kHz-32MHz)
Singer Stoddart NM37/57 EMI/Field Intensity Meter (30MHz-1GHz)
Singer Broadband Active Antenna (10kHz-32MHz)
Dynamic Sciences Bi-concial Antenna (30MHz-20MHz)
Singer Conical Log-spiral Antenna (200MHz-1GHz)
Hewlett Packard X-Y Plotter

2. **TEST METHOD**

2.1 The EUT was positioned on the copper ground plane in the screend enclosure in the EMC building. It was isolated from the ground plane by an approximately 50mm thick insulated support. The appropriate antenna was positioned one metre fro the EUT, with the output from the antenna fed through a bulkhead adaptor to the input of the appropriate compartment of the screened enclosure. The X-Y plotter was connected to the output of the appropriate EMI/Field Intensity Meter through the P7 Programmer.

2.2 Plots were made of the radiated emissions over the frequency range 10kHz-1GHz for the following conditions

EUT switched ON. Rapier Test Program 2 "FLAT SEZ" selected.

2.3 Tests of radiated susceptibility were performed in the screened enclosure. The EUT was placed approximately 500mm from the IFI EPG-3 antenna and subjected to a field strength of 5 volts/metre over the frequency range 100kHz-180Mhz with the EUT functioning as detaile din Paragraph 2.2 above. The EUT were observed for any malfunction or corruption of display.

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3. **RESULTS**

3.1 Plots of radiated emissions are shown in Figures 1 and 2.

3.2 Emissions from the Husky Hunter above 30MHz were negligible.

3.3 The unit was not susceptible to the radiated electric field of 5 volts/metre over the frequency range 100kHz-180MHz.

4. **CONCLUSIONS**

4.1 Radiated emissions from the HUSKY HUNTER are below the narrowband limit. Measurements of broadband interference were not made in view of the low level of emissions.

4.2 The unit did not appear to pose a susceptibility problem at frequencies up to 180MHz.

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HUSKY TECHNICAL NOTE

Number 122

Issue 1 Date 07DE84

Applicable to: HUSKY 64K & 96K OPERATING SYSTEMS VERSION HC06000CT

Abstract:

Title: PROGRAM FAULT ON HUSKY 96K AND 64K MODELS

This information is applicable to the 64K and 96K versions of the Husky computer in which a fault has become apparent.

When the program autosizes, it obtains the top of the memory value incorrectly, resulting in the machine producing "out of space" error messages when loading programs in excess of 30K.

This problem can be overcome by the following procedure:

Prior to loading the program, type:

```
POKE     20480, 252, 255
```

then load the program as usual and type the following to restore the value:

```
POKE     20480, 255, 191
```

The normal program execution can then be continued

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HUSKY TECHNICAL NOTE

Number 123

Issue 1 Date 10DE84

Applicable to: HUNTER OPERATING SYSTEMS AFTER VERSION 9Fn

Abstract:

Title: USE OF RANDOM FILE ACCESS WITH HUNTER BASIC

CONTENTS

INTRODUCTION

The purpose of this document is to describe the Hunter file handling procedures and outline in detail a means of providing Random file handling with Basic, using machine codes and ancilliary basic routines.

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HUSKY TECHNICAL NOTE

Number 123

Issue 1 Date 10DE84

1. **HUNTER FILE HANDLING**

The following section describes how files are specified and stored within the Hunter, and also explains some of the terms used in describing the machine code outlined later in this document.

Essentially the Hunter memory area is divided into three sections:

(i) Work Area - an area for executing programs from

(ii) Directory Area - an area for storing 'file descriptions'.

(iii) Storage Area - the actual area in which files themselves are stored together with the directory area, constitute the Hunter 'disk' storage medium.

In order for a file to exist at all within the Hunter, it must have an entry in the directory. The directory entry may be described as a 'File Control Block' (F.C.B.).

The file control block provides all relevant information on the file itself, such as it's name, size and the actual areas of memory in which the file resides.

A file is divided into 128 bytes areas of memory called sectors, sixteen of which form a file block. Each file block is attributed a a unique number which describes its' location within the Hunter memory. The file blocks allocated to the file are stored in the allocation table contained in the FCB.

In order for a file to be accessed, the user must provide his own FCB which initially contains the file name only. The other information is normally completed in the users FCB, by the call being executed, which usually updates the users FCB with the more detailed information contained in the directory.

Therefore, care must be taken not to corrupt the information in the FCB, as destruction of this information means probable destruction of the file itself.

To enable file information itself to be transfered, the user must also provide a Direct Memory Access Buffer (DMA) which is simply a buffer capable of storing a sector of information (128 bytes long).

TABLE 1 FCB ALLOCATION TABLE

dr	f1	f2	f8	t1	t2	t3	ex	s1	s2	re	d0	dn	cr	r0	r1	r2
0	1	2	8	9	10	11	12	13	14	15	16	31	32	33	34	35

dr	=	drive code - normally zero
f1-f8	=	file name in ascii
t1,t2,t3	=	file attribute
ex	=	contains current extent
s1,s2	=	internal use only
rc	=	record count
d0 -du	=	allocation block numbers (system use only)
cr	=	current record number
ro,r1,r2	=	random record numbers

Note: r2 MUST be zero ro-r1 constitute a
16-bit value in range 0 - 65535.
low-byte = ro, high byte = r1

IMPORTANT:

ALL BYTES EXCEPT R0, R1 & R2 MUST BE REGARDED IN THIS CASE FOR SYSTEM USE ONLY. FAILURE TO COMPLY WITH THIS COULD RESULT IN FILE DAMAGE.

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2. **FILE HANDLING**

Hunter's operating system provides file handling routines through the CP/M environment, providing the necessary calls to create, write and read from files within the Hunter's pseudo-disc system.

The following calls are particularly relevant to file handling:

OPEN - CALL 15

This call is used to activate a file which already exists. When the file is found in the directory, the information contained in the directory referring to that file is copied into the file control block.

CLOSE - CALL 16

This call provides the inverse of the OPEN call; it permanently records current file control block information into the directory entry for that file.

It should be noted that a CLOSE need not necessarily be performed after a file has been read only. If a WRITE operation has been performed, a CLOSE call must be executed in order to record the new file parameters resulting after WRITE.

READ SEQUENTIAL - CALL 20

If a file has been 'opened', a READ SEQUENTIAL call causes the next 128 bytes of the file to be read. The call automatically increments the relevant sections of the file control block to ensure that the next read reads the next 128 bytes.

WRITE SEQUENTIAL - CALL 21

Given that a file has been 'opened'. a WRITE SEQUENTIAL causes the current contents of the DMA buffer to be written to the next 128 bytes of the file. After the write has been performed, the relevant sections of the FCB are incremented, so that the next WRITE SEQUENTIAL call writes to the next 128 bytes of the file.

MAKE FILE - CALL 22

The make call is similar to the open call except that the file must not already exist. This call creates a directory entry for a file. This call also 'opens' the file making a subsequent open call unnecessary.

READ RANDOM - CALL 33

A READ RANDOM call is similar in operation to a SEQUENTIAL READ, except that the record to be read is defined by a 24 bit record number specified by three bytes of the FCB, namely r0, r1, r2.

After the read has been performed, the record is not incremented, therefore subsequent random reads would simply re-read the same record.

WRITE RANDOM - CALL 34

The WRITE RANDOM call is similar in operation to a SEQUENTIAL WRITE, except that the record to be written is defined by a 24 bit record number r0, r1, and r2.

As with read random, the record number is <u>not</u> automatically incremented after the WRITE operation.

WRITE RANDOM WITH ZERO FILL - CALL 40

A WRITE RANDOM WITH ZERO FILL is similar in operation to the WRITE RANDOM function, except that a previously unallocated block is filled with zero's prior to performing the WRITE operation.

The aforementioned information is only an elementary guide to the CP/M operating system. Users who wish to seek further information will find the following reference useful:

: Soul of CP/M by Mitchell Waite and Robert Lafore

: Published by Howard W Sams & Co. Inc.

: International book No: 0-672-22030-X

3. BASIC FILE HANDLING

Fortunately for the user, many of the technicalities and pitfalls of file handling calls are catered for by the Basic interpreter. The descriptions outlined previously need not concern the general user who simply wants to access files in the normal manner.

However, the Hunter Basic interpreter file handling provides only sequential file handling; that is a files are opened, read from or written to sequentially from start to finish, and then closed.

There is an exception to this in that, in Hunter Basic, it is possible to 'append' data to the end of files but, in general, if only a sector of data is required to be written to or read from the middle of a file, the file must be read or written up to that sector.

As outlined previously, the READ RANDOM and WRITE calls are available in Hunter's CP/M operating system. Therefore, by implementing a machine code link it is possible to provide users with a means of performing random access to Hunter files within Basic. This is particularly useful for applications such as stock control or inventory programs where sections of files need to be inspected/modified.

When a file is opened in Basic, an entry is made in the symbol tables which:

i) describes where the file's FCB is located,
ii) where the file's DMA is stored,
iii) whether the file was opened for output, input or append. The FCB is automatically initialised by the interpreter and the file is opened or made depending on the command entered.

If several files are created, then for each file there is a symbol table entry and each file will have its own FCB and DMA buffers.

The Basic interpreter imposes stringent controls on the file commands entered in order to protect the user's files. For example, if a write is attempted to a file which has been opened for input, an error will occur.

Once in machine code, none of this 'correcting' is performed as the interpreter is by-passed, therfore care must be taken in executing the machine code.

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There are six stages required in implementing random calls within basic. These will be outlined in detail following, together with an example program to finish.

3.1 Stage 1 - Installing machine code

Table 2 illustrates actual machine code required for this application. This must be loaded into a common area of RAM from which execution will occur.

A suitable area is user RAM area at F608H [62984D], where the code will remain permanently unless modified by the user.

Having machine code in RAM has the advantage that the code can be modified for different FCB's and DMA's by the user poking the relevant locations, reducing the amount of machine code required.

```
POKE 62984,14,22,24,14,14,40,24,10,14,16,24,6,14,33,24,2
POKE 63000,14,34,197,14,26,17,128,0,205,5,0,193,17,7,213,195,5,0
```

TABLE 2. **MACHINE LANGUAGE LINK**

```
F608 0E16    MAKE:    LD   C,16H      ;[62984]  MAKE
F60A 180E             JR   DOIT
F60C 0E28    FILL:    LD   C,28H      ;[62988]  WRITE BLOCK FILL
F60E 180A             JR   DOIT
F610 0E10    CLOSE:   LD   C,10H      ;[62992]  CLOSE
F612 1806             JR   DOIT
F614 0E21    READR:   LD   C,21H      ;[62996]  RANDOM READ
F616 1802             JR   DOIT
F618 0E22    WRITER:  LD   C,22H      ;[63000]  RANDOM WRITE
F61A C5      DOIT:    PUSH BC
F61B 0E1A             LD   C,1AH      ;Set DMA address
F61D 1B000            LD   DE,0080H   :[E(Low)=63006 : E(high)=63007 ]
F620 CD0500           CALL 5H
F623 C1               POP  BC         ;Load fcb address
F624 1107D5           LD   DE,0D507H  ;[E(Low)=63013 : E(high)=63014 ]
F627 C30500           JP   5H

             ;
             ;
             ;
             ;
F62A                  END
```

3.2 **Stage 2 - File Initialisation**

The Number of files which can be opened simultaneously in Basic must be defined by the user at the start of the program. Although there is a default in Basic of one file, to simplify the applications description a maxfile statement MUST be used even if this is of the form MAXFILES=1

Consider MAXFILES=3

The Basic interpreter creates the space for the fcb's and DMA's for each of these files. Additional information relevant only to Basic is also created for each file, resulting in 168 bytes being allocated in total for each file.

It is necessary now to 'MAKE' the three files to be used for the application. In order to keep the machine code required to a minimum, Basic can be used to set up the fcb's with the file name prior to executing the call to make the file in machine code.

At this stage it is worth commenting that the files are not created by OPEN, the file for OUTPUT in Basic. If this was done, a file 2K in length would be created, as Basic needs to insert a terminator character (1AH) in the file when closed, resulting in a file of mimumum length 2K bytes being created.

Consider the creation of three files, TEST1.DTA, TEST2.DTA and TEST3.DTA. The three files must not already exist. If they do, they must be KILLed by Basic.

```
10 ON ERROR GOTO 10000
20 OPEN"TEST1.DTA"FOR INPUT AS1
30 OPEN"TEST2.DTA"FOR INPUT AS1
40 OPEN"TEST3.DTA"FOR INPUT AS1
;
;
;
;
10000 CLOSE
10010 A=CALL(62984):A=CALL(62992):RESUME NEXT
```

Action of the above Basic code is to cause an error to be trapped as soon as line 20 is executed by the interpreter, as TEST1.DTA does not as yet exist.

The interpreter execution then goes to line 10000 where the file is CLOSEd in Basic, and the machine code is executed to first MAKE and then close the file. A zero length file called TEST1.DTA is created in the disk space.

Note: In Basic as the file was OPENed for INPUT, the action of the Basic statement CLOSE is to inform the interpreter that the file is no longer available for use, the Basic CLOSE statement does not close the file in this case as the file was read only.

Observe that the file has been opened as £1, as the relevant FCB for this file is already loaded into the machine code.

The interpreter is then told to 'RESUME NEXT' which causes the interpreter to continue execution following the statement in which the error occurred, in this case line 30.

The procedure is repeated until three zero length files have been created which concludes the file initialisation stage.

This stage should only be executed once for the files, so the Basic application program should be written to ensure this is the case.

3.3 **Stage 3 - Opening the Files for use**

B TSNM MTOXE TSE UNWEM MSACWD SOLE FEEI YREOTED OM VERA WEIXTS UNWEM in the disk space.

The OPEN file for INPUT statement can now be used to initiaise the relevant fcb's with the file names ready for use by the machine code. **Note:** The inputting from a zero length file will cause an error. In order that the error is avoided, the error is trapped and, in this case, ignored as it is expected under this mode of operation.

```
45 ON ERROR GOTO 65000
50 OPEN"TEST1.DTA"FOR INPUT AS £1
60 OPEN"TEST2.DTA"FOR INPUT AS £2
70 OPEN"TEST3.DTA"FOR INPUT AS £3
75 ON ERROR GOTO 0
65000 RESUME NEXT
```

Once the files are opened, it is advisable to cancel the error trapping so that TRUE errors are shown.

Table 3 shows the organisations of the FCB's and the addresses which are relevant to this particular application.

Additional addresses have not been supplied as this will only lead to confusion.

Note: The order in which files are OPENed in Basic will alter where each file's FCB's are located in memory. Care should be taken to adhere to this example or verify that the locations are correct for your application.

TABLE 3. **IMPORTANT ADDRESSES AND LOCATIONS RELEVANT TO APPLICATION**

```
        ---------------------
D657H  |                     |
       |                     |
       |                     |
       |                     |      fcb = D657H
       |         £3          |      r0  = 54904D
       |                     |      r1  = 54905D
       |                     |      r2  = 54906D
       |                     |      dma = D67FH
        ---------------------
D5AFH  |                     |
       |                     |
       |                     |
       |                     |      fcb = D5AFH
       |         £2          |      r0  = 54736D
       |                     |      r1  = 54737D
       |                     |      r2  = 54738D
       |                     |      dma = D5D7H
       |                     |
        ---------------------
D507H  |                     |
       |                     |
       |                     |
       |                     |      fcb = D507H
       |         £1          |      r0  = 54568D
       |                     |      r1  = 54569D
       |                     |      r2  = 54570D
       |                     |      dma = D52FH
       |                     |
       |                     |
        ---------------------
```

3.4 Stage 4 - Transacting data to and from the Files

Transfering data to and from the files can be performed in several ways. The direct way is to poke the information into the relevant DMA buffer for the file concerned and then executing the WRITE call. Data can be read from the file by performing the READ and then PEEKing the information from the DMA buffer. This operation can be used, but is a slow and laborious method.

A Subtler method can be employed with a little knowledge of the Hunter's array and string storage methods, giving a more convenient direct interface between basic and the file's DMA buffer.

If string information is to be handled, the DMA buffer can be a string. The string must have a length of at least 128 bytes. For convenience in this application, the length byte has been incorporated into the DMA buffer which simplifies the string manipulations, but which means that the actual sector storage area is reduced by one byte to 127 bytes.

When the full 128 bytes are required, the user must ensure that the string length is always made up to 128 bytes. By using the VARPTR statement, the address of the string can be found and substituted into the DMA address of the machine code prior to a read or write to the file.

```
Consider:  DIM D$(0,128) dimension string

           W=VARPTR(D$)-1  point to length byte

    H=FIX(W/256):L=W-256*H

where  H = high order address byte
       L = low order address byte of the dma buffer string D$
```

If numeric data is to be used, the DMA buffer can be a single precision array. The number of elements in the array must be not less than 25 in order for the array to be not less than 128 bytes in length.

HUSKY TECHNICAL NOTE

Number 123

Issue 1 Date 10DE84

WARNING: If the array occupies less than 128 bytes, arrays following the array used as the DMA buffer will be corrupted. The DMA buffer is always 128 bytes in length.

Consider: DIM D(25) dimension string

```
W = VARPTRD(0)-4

H=FIX(W/256):L=W-256*H
```

where H = high order address byte
L = low order address byte of the DMA buffer array D(x)

Once the DMA method has been chosen, it is then simply a matter of:-

i) setting the DMA address to be used
ii) setting the relevant fcb address
iii) loading the random sector number bytes and executing the random READ or WRITE call.

For example: to write to sector X

```
POKE 54904,X:POKE 63006,L,H:POKE 63013,87,214

A = CALL(62988)
```

or to read from sector X

```
POKE 54904,X:POKE 63006,L,H:POKE 63013,87,214

A = CALL(62996)
```

NOTE: In either case, if A is non-zero, the read or write has failed either due to the FCB information being incorrect or, in the case of a write, there being insufficient space on the disk.

HUSKY TECHNICAL NOTE

Number 123

Issue 1 Date 10DE84

```
5 REM ** Random File Demonstration ** < J.J.B. >
10 ONPOWERGOTO60000:IFwz=55THEN100   'trap power key and test if initialised
REM Set up the machine code at F608H
20 POKE62984,14,22,24,14,14,40,24,10,14,16,24,6,14,33,24,2
30 POKE63000,14,34,197,14,26,17,128,0,205,5,0,193,17,7,213,195,5,0
REM Initialise the dma buffers to be used
40 MAXFILES=3:DIMt$(0,130),s$(0,130),d(26)
50 w=VARPTR(d(0))-4:hd=FIX(w/256):ld=w-256*hd
60 w=VARPTR(s$)-1:hs=FIX(w/256):ls=w-256*hs
70 w=VARPTR(t$)-1:ht=FIX(w/256):lt=w-256*ht
REM Make and close the file in machine code
80 ONERRORGOTO20000
90 OPEN'test1.dta'FORINPUTAS1
92 OPEN'test2.dta'FORINPUTAS1
94 OPEN'test3.dta'FORINPUTAS1
96 wz=55
REM Use Basic to open the files initially
98 ON ERROR GOTO 65000
100 OPEN'test1.dta'FORINPUTAS1
110 OPEN'test2.dta'FORINPUTAS2
120 OPEN'test3.dta'FORINPUTAS3
125 ON ERROR GOTO 0
REM Main program loop starts here
130 POKE54905,0,0:POKE54569,0,0:POKE54737,0,0   'initialise the r1,r2 of fcb's
140 CUROFF:SCREEN1:CHAR2,1:PRINT'Customer record';
150 CHAR0:LOCATE40,35:INPUT'Enter customer number >',X:SCREEN0
REM Read the sector X of each file
160 POKE54736,X:POKE63006,ls,hs:POKE63013,175,213:a=CALL(62996)
170 POKE54904,X:POKE63006,ld,hd:POKE63013,87,214:a=CALL(62996)
180 POKE54568,X:POKE63006,lt,ht:POKE63013,7,213:a=CALL(62996)
REM If failed to read then assume it to be a new sector
190 IFa<>0ORd(0)=0THENGOSUB50000
200 GOSUB1000:GOTO130
REM Display routine to take file data and display it to operator
1000 KEYOFF:OPCHR1:PRINT'Cust No # ';X
1010 LOCATE2,2:PRINTLEFT$(s$,20);:LOCATE2,3:PRINTMID$(s$,21,20);
1020 LOCATE2,4:PRINTLEFT$(t$,20);:LOCATE2,5:PRINTMID$(t$,21,20);
1030 LOCATE20,2:PRINT'stock no ';d(1):LOCATE20,3:PRINT'min stock';d(2)
1035 LOCATE20,4:PRINT'Stock Lev';d(3)
REM Section to ask for the stock level update
1040 BEEP:LOCATE5,7:INPUTUSING('NNNN',0,4);'Enter stock change :',y
1050 d(3)=d(3)+y:IFSGN(d(3))=-1THENd(3)=0
1060 GOSUB50040:RETURN
REM Subroutine to close the file in basic, then MAKE and CLOSE the file
20000 CLOSE:a=CALL(62984):a=CALL(62992):RESUMENEXT
REM Subroutine to CLOSE files in machine code
40000 POKE63013,7,213:a=CALL(62992)
40010 POKE63013,175,213:a=CALL(62992)
40020 POKE63013,87,214:a=CALL(62992):RETURN
REM Routine to obtain new data from the user
50000 CLS:INPUT'Enter name: ',a$:INPUT'   address: ',b$
50020 INPUT'      town: ',c$:INPUT'    tel no: ',d$
50025 INPUTUSING('NNNN',0,4)'Enter stock no :',d(1)
50026 INPUTUSING('NNNN',0,4)'Enter min stock level :',d(2):d(0)=55:d(3)=0
REM Arrange data in convenient way into the 'DMA buffer strings'
50030 s$=a$+SPACE$(20-LEN(a$))+b$
50035 t$=c$+SPACE$(20-LEN(c$))+d$
REM Subroutine to write sector X to the files
50040 POKE54568,X:POKE63006,lt,ht:POKE63013,7,213:a=CALL(62988)
50045 POKE54736,X:POKE63006,ls,hs:POKE63013,175,213:a=CALL(62988)
50050 POKE54904,X:POKE63006,ld,hd:POKE63013,87,214:a=call(62988):RETURN
REM Routine to trap user turning off machine so as to close files correctly
60000 GOSUB40000:CLOSE:POWEROFF
65000 RESUME NEXT
```


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Issue 2 Date 09JA85

Applicable to: Hunter, S.P. and M-208 Operating Systems up to 9G

Abstract:

Title: Communication Parameters

The Husky Hunter allows the user the facility to execute his own machine code routines from a Basic program.

During the development of the user's machine code, errors may be made by the user which may change the RAM used by the operating system. Part of the RAM which may be changed could be associated with the communications parameters.

The following program line will reset the communications parameters to values which will be recognised by the operating system.

```
FORI=63480TO63493:POKEI,0:NEXT: POKE63563,128:POKE63581,0,0
```

Husky Hunter Basic will not corrupt the operating system RAM.

HUSKY TECHNICAL NOTE

Number 126

Issue 2 Date 09JA85

Applicable to: HUNTER, SP and M-208 Operating Systems up to 9G

Abstract:

Title: I.B.M. PROTOCOL 3780

The IBM Protocol 3780 includes a facility to select the component on the receiving terminal, to which the data is to be routed (ie. printer or card punch). This is achieved by sending one of the following characters;

```
        DC1     (11 Hex or 17 Decimal)    Selects the printer

        DC2     (12 Hex or 18 Decimal)}
                                      }   Select card punch.
                                      }   Note: either may be used
   or   DC3     (13 Hex or 19 Decimal)}         but not both.
```

These select characters are only valid if they are received as the first text character of the first block when the block is:

i) received as a positive response to a line bid acknowledgement

ii) the first block of a following ETX

Any applications using the IBM 3780 protocol should be aware of this feature and should ignore the characters when they appear in this position. A select character in any other position in the block is data and should not be ignored.

Basic will automatically do this in an INPUT statement.

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HUSKY
TECHNICAL NOTE Number 136

Issue 2 Date 09JA85

Applicable to	All Husky Hunter Operating Systems
Abstract	
Title	INSTRUCTIONS FOR REPLACING EPROMS

DISMANTLING PROCEDURE

1. Remove the batteries from the machine and lay the Hunter face down on a soft work surface. The work area must be dry and clear of all dust and other contaminants.

2. Using a 2mm (across flats) hexagon key, release and remove the twelve Allen screws from the rear cover, observing a reverse diagonal torque sequence (as illustrated in Figure 1) to prevent distortion of the cover.

3. Gently lift the cover and turn through 180 degrees. Place the cover face down adjacent to the bottom of the case.

4. Push off the 17 way keyboard connector, taking care not to stress the membrane connector.

5. Check for any necessary hardware modifications and the revision of the Central Processor Unit (CPU) number (found adjacent to the keyboard connector) 470-x-x. This information is on an accompanying sheet. If hardware modifications are required, remove the standby battery 'memory' link. This is indicated by a large arrow near the keyboard connector.

6. Insert a small screwdriver under the top left hand corner (adjacent to the RS-232 connector) of the printed circuit board (PCB). Using the case edge, gently lever the PCB sufficiently up to disconnect the 25 'D' type from the PCB.

   NOTE: The PCB need only be lifted 2mm for this operation.

7. Using both hands to hold the PCB adjacent to the ends of the battery tube, lift the PCB assembly out from the case from the battery tube side. Remove the case assembly from the work area and store keyboard up to avoid dust falling on the inside of the screen.

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8. It may be found necessary to remove the display screen for either changing the Silica Gel bag (if blue indicator on display has turned pink) or for modification to the Central Processing Unit. Under no circumstances should the display be hinged more than 90 degrees as serious damage to the flexible connector may occur.

9. **80K units only:**

   Using the Husky extraction tool P-200-6000, gently push out the EPROMs from the rear locating the four pins on the tool with holes in the PCB.

10. **144K/208K/352K Units only:**

    These units have extension RAM boards fitted. Using a 2mm (across flats) hexagon key, release the three Allen screws from the top of the RAM board whilst supporting the bottom screws and unscrewing the top screws. Gently hinge open the RAM board taking care not to stress the flexistrip connectors.

    CAUTION On certain units, it is possible that the pillar will rotate and the screw will not come out. In this event, use a second 2mm hex key on the underside of the Central Processing Unit to loosen the assembly. Do not attempt to grip the pillar with pliers.

11. Using the Husky extractor tool P-0200-6000, gently push out the EPROMs.

12. Replace with new EPROMs. Check that all pins are positively located in to their respective sockets. Ensure EPROMs are in their correct order, ie: reading from right to left 0, 1, 2, 3, 4 and 5.

    Check that EPROMs are in the correct orientation, ie: recess in EPROM is at end adjacent to the display.

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ASSEMBLY PROCEDURE

13. Re-assemble the RAM board (if fitted) taking care not to strain the flexistrip.

14. Ensure that the LCD screen and the inside of the case are dust free. If necessary, clean gently with a lense cloth. Beware of static attracting particles into the screen area.

15. It should be noted that the display edge locates under a recess in the case. This must be inserted first on re-assembly of the CPU to the case.

    NOTE: Do not place any strain on the flexible membrane connector whilst positioning the CPU beneath it.

16. Before lining up the pins on the 25 way D type, note that not all of the 25 sockets are fitted - only those used. Looking through the vacant space holes, line up the pins and sockets before locating fully home. Do not exert excessive pressure as this denotes that the pins are not aligned correctly. The pins only require a light pressure - you will feel the pins and sockets engage smoothly. If difficulty is experienced, it is probably due to a pin being bent over. Remove and check that all pins are vertical and are equally spaced. Adjust if necessary with fine nosed pliers **NOT** fingers.

17. Before replacing the keyboard connector you will notice a large arrow on the PCB and a small soldered link. This is the memory link and, unless you are trying to save a program, should be disconnected for 40 seconds then reconnected. Care should be taken to make a good soldered joint as this is the main memory backup link. If it is not connected correctly it results in a memory loss when changing batteries.

18. Replace the keyboard 17 way connector. Take care to observe that the flexible membrane is delicate and should not be damaged, as this will render the keyboard unserviceable and require a complete keyboard service. AT ALL TIMES THE FLEXIBLE MEMBRANE TAIL MUST BE TREATED WITH EXTREME CARE.

19. Check the cover gasket for damage and replace if necessary - part number C5720-6500.

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20. Fit the cover by referring to the torque sequence diagram Figure 1, ensuring the flexible membrane is NOT trapped between the cover and case.

21. Replace the batteries in the machine.

22. Switch on the machine. Enter format in the file manager. Check that all memory is present,

    ie: 80K will have 14K,
    144K will have 76K,
    208K ill have 138K.

23. Run the Hunter system test.

HUSKY TECHNICAL NOTE

Number 137

Issue 1 Date 08JA85

Applicable to: REPORTER

Abstract:

Title: MULTIPLE LINE FEEDS ON HUSKY REPORTER

When printing invoices or statements, etc. on the Husky Reporter, a common requirement is to eject the paper quickly and efficiently.

The Reporter supports a multiple line feed facility for this as described in section 4.3 of the Reporter manual.

Essentially it is only necessary to output a DC1 character which is 11H or 17 decimal, followed by the number of line feeds required, eg:

```
LOPCHR 17,10
```

will eject the paper 10 lines.

This facility greatly enhances the apparent speed of the Reporter.

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HUSKY TECHNICAL NOTE

Number 139

Issue 1 Date 09JA85

Applicable to

Abstract

Title ROBUST HUNTER TO MAINFRAME COMMUNICATIONS USING BISYNC

1. INTRODUCTION

Many Hunter applications, including Salesman Order Entry, Van Sales, Meter Reading, etc. depend upon reliable daily communications between the Hunter and a mainframe system. Typically, this has to use the Public Switched Telephone Network (PSTN).

Hunter provides a wide variety of protocols and speeds which can seem confusing. This paper is intended to explain Husky's preferred means of communication.

2. PROTOCOL

The host computer is often a mainframe system currently in use by the customer. This may contain the bulk of the system information needed for large installations and where the data collected needs to be stored and used.

The exchange of data between Hunter and mainframe needs to be protected against errors by an automatic error-checking protocol.

There is no universal asynchronous protocol for use on noisy communications channels. This means that if one is selected, an emulator may need to be written either for the host computer, the Hunter or both.

This is not desirable for time, cost and technology reasons. It is very difficult to design a reliable, efficient communications protocol especially using an asynchronous carrier.

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A universally accepted standard on most mini and mainframe computers is IBM's bisync using 2780 or 3780 emulators. Clearly, a de facto standard is very desirable and for this reason there is an optional 2780/3780 emulator available on the Hunter, utilising synchronous transmission techniques.

This system is attractive as it provides a very well tested communications protocol design. It is considerably more efficient than any asynchronous protocol in terms of actual valid data characters per second. 2780/3780 is a half duplex protocol, meaning that data is only transmitted in one direction at one time. This can be economical as half duplex modems are cheaper than full duplex modems.

3. SYNCHRONOUS COMMUNICATIONS

Bisync is a synchronous protocol which, unlike asynchronous, generally requires a 'clocking' signal from the modem.

Synchronous communications requires that both sending and receiving computers remain in perfect 'bit' synchronisation for blocks of up to 500 characters. Typical hardware on computers of all sizes requires a signal from the modem to tell it when to transmit a bit - this is called the clock.

Synchronous modems are capable of very high speed, up to 9600 b.p.s., but are more expensive than low speed asynchronous models.

4. COMMUNICATION TIME

In general, applications supporting a man on a daily basis using daily transmissions (salesman, van salesman, meter reader, etc) will have a maximum amount of data of about 25K characters to transfer as a total for data in both directions. Special applications may have a greater volume but these should be considered exceptional and can typically either use a faster modem or accept longer communications times.

For a user communicating using a private telephone line, call duration should not exceed 5 minutes for convenience and reliability of the line.

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This therefore requires a data character throughput of:

$$> \frac{25,000}{300} = 83 \text{ characters per second}$$

5. THE REQUIREMENTS

As discussed above, the ideal system should have the following features:

a) Character throughput > 85 characters per second.
b) Protocol compatible with most mini/mainframe computers.
c) Be very reliable over PSTN.
d) Inexpensive.

Features (a), (b) and (c) can be realised using synchronous 2780/3780. The problem is providing feature (d).

In a system with a significant number of Hunters communicating with a central site, the cost of the communications link is dominated by the cost of the modem associated with each Hunter. The central site modems being fewer in number can stand a higher cost.

6. MODEM SELECTION

As discussed above, synchronous protocols generally need synchronous modems to operate with the communication channels on most computers. Essentially, they provide two clock signals for synchronising the transmit and receive data paths. This is likely to be true of the host computer to be used on a system and, despite the higher cost of synchronous modems, is acceptable due to the few modems required at the host.

At the Hunter end, it is essential that modem costs are kept down. Hence, it would be desirable to use a relatively low cost, competitive asynchronous modem. If frequency shift keying (f.s.k) is used as the data carrier by the modem, clocking can be recovered from transitions in the data stream.

Synchronous V23 modems perform this function using hardware within the modem.

The Hunter has the capability of recovering the clock internally, so it is possible to use an asynchronous modem, with a synchronous modem at the host site.

There is only one modem standard which meets the above criteria:-

CCITT V23.

This provides a 1200 b.p.s. half duplex f.s.k. link.

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The data rate of 1200 b.p.s. gives tested typical character throughputs of 95 characters per second with a maximum of 100 c.p.s.

This throughput is achieved with all the check and acknowledge characters, line turnaround and retransmissions due to noise taken into account.

The theory of using an asynchronous V23 modem to carry a true synchronous communications channel is unfamiliar to many data communications personnel. The feature that makes it possible is the use of a regenerated clock within the Hunter.

Other common modem standards do not have the same attraction as the V23 solution proposed above:-

V21 300 b.p.s. Full Duplex F.S.K. Asynchronous

This standard is very popular for simple dial up systems since it is asynchronous, full duplex, needing minimal modem controls. It is, however, very low speed and there is not a commercially available synchronous version for use with a host computer.

Its cost is very similar to the V23 standard.

V22 1200 b.p.s. Full Duplex P.S.K. Asynchronous/Bisynchronous

This is a faster version of V21 using phase shift keying. It is full duplex asynchronous which makes it easy to use. It is also available in synchronous form. However, it is very expensive for the throughput. It is slightly faster than V23 as there are no line turnaround delays, but it costs approximately twice an equivalent of the V23 modem.

V26 2400 b.p.s. Half Duplex P.S.K. Synchronous

A true synchronous standard. This is economical for high throughput. It is half duplex which makes it economical. The cost is approximately one and a half times that of V23.

V27, V29, etc.

These are high speed half duplex modems, synchronous only. In general these are too expensive for this application.

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7. PRACTICAL SYSTEM

A communication system for a practical Hunter to host computer would be:-

Communication media	:	PSTN (Public Switched Telephone Network)
Protocol	:	IBM 2780/3780
	:	Synchronous
Modem Standard	:	CCITT V23
Line Speed	:	1200 b.p.s.
Host modem	:	RACAL MPS1223 with synchronous adaptor part number 4415-255AAE and
	:	PSTN adaptor part number 4415-255AAD
Hunter modem	:	Master Systems 2123 or Virtually any V23 modem

NOTE: With the Racal MPS1223 it is necessary to disable the encoder and decoder circuitry on the synchronous adaptor board by installing strap (a) on that board.

This circuit is used when communicating between two MPS1223 modems, it prevents extended periods with no data transitions. This is not possible using non-transparent 2780/3780 protocol.

8. ACOUSTIC COUPLERS

There are some V23 acoutic couplers.

It is possible to replace the Hunter modem with an acoustic coupler for some applications. The use of acoustic couplers is regarded as a judgemental area because of unpredictable "on the day" performance, but with good lines acoustic couplers will give similar results to conventional modems.

Battery operated 1200 baud acoustic couplers are becoming available, but so far only mains powered types are recommended.

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